

Math 305, Quiz 8
December 6, 2007

Name: _____

- (1) (5 pts) Draw a Venn diagram for the sets *rings*, *commutative rings*, *unital commutative rings*, *integral domains* and *fields*. Insert in this diagram the following rings: \mathbb{Z} , \mathbb{C} , $\mathbb{Q}[\sqrt{5}]$, $\mathbb{Z}[\sqrt{3}]$, $M_2(\mathbb{C})$, $\mathbb{Z}[i]$, $\mathbb{Z}_5[x]$, $\mathbb{Z}_6[x]$, $2\mathbb{Z} \times 3\mathbb{Z}$, $5\mathbb{Z}$ and $M(\mathbb{R})$. (Recall that $M_2(\mathbb{C})$ is the ring of 2×2 matrices over \mathbb{C} and $M(\mathbb{R})$ is the ring of functions from \mathbb{R} to \mathbb{R} .)

- (2) (5 pts) Decide (with proof) whether the map $\phi: \mathbb{C} \rightarrow M_2(\mathbb{R})$ given by $\phi(a + bi) = \begin{pmatrix} a & b \\ -b & a \end{pmatrix}$ for all $a + bi \in \mathbb{C}$ is a ring homomorphism.